Versar INC.

MEMORANDUM

TO:	Laura Casey	cc:	Jim Buchert Diane Sinkowski
FROM:	Ann Cyrus		11.1126.2000.001
DATE:	August 2, 2005		
SUBJECT:	Comments on the Method 3 Risk Characterization – Wetland Areas, Former McCoy Field, New Bedford, MA (June, 2005)		

General Comments:

Review of Methodology and Calculations

Overall, the methodology for the risk assessment was reasonable and appeared to be consistent with the appropriate EPA and Massachusetts Department of Environmental Protection (MADEP) guidance. Specific comments regarding exposure pathways and receptors evaluated are detailed in the specific comments section.

The PCB data provided in Table 2 of the report were analyzed to estimate the upper confidence limits using ProUCL. The results obtained were consistent with the ProUCL summary results provided in Appendix C of the report, with a recommended UCL of 2089 ug/kg (97.5% Chebyshev (Mean,Sd) UCL).

The risk characterization tables for robins and hawks in Appendix D and the tables for the shrew and raccoon in Appendix E were reviewed to determine if the formulas and calculations were correct. Using the exposure assumptions provided in the report (which seemed reasonable), the PCB total intake levels and hazard quotients (HQs) estimated for these receptors were consistent with the PCB exposure levels and HQs given in the Appendix tables. Any discrepancies noted in the calculations in the Appendix tables were minor, and are noted in the specific comments section.

Congener Analysis vs. Total PCBs (as Aroclor 1254)

A PCB congener analysis was conducted to estimate potential risks to ecological receptors from exposure to dioxin-like PCB congeners at the site. Using the congener-specific PCB composition data for Aroclor 1254 (provided on EPA's website http://www.epa.gov/toxteam/pcbid/aroclor_comp_frame.htm) and the 1997 WHO Toxic

Equivalency Factors (TEFs) for dioxin-like PCBs, the 2,3,7,8-TCDD equivalent soil concentrations were estimated. Based on an Aroclor 1254 exposure point concentration (EPC) of 2.09 mg/kg, the estimated 2,3,7,8-TCDD equivalent concentrations in soil were 1.07E-04 mg/kg for mammals and 2.37E-04 mg/kg for birds, respectively.

These 2,3,7,8-TCDD equivalent concentrations were then used to evaluate potential risks for the four receptor species (robin, shrew, hawk and raccoon) using the same exposure assumptions from the risk assessment report. Toxicity data for 2,3,7,8-TCDD were obtained from Sample et al (1996). Estimated hazard quotients (HQs) for both PCBs (as Aroclor 1254) and 2,3,7,8-TCDD are provided in the Table below:

	Robin	Shrew	Hawk	Raccoon
Compound	HQ High (Low)	HQ High (Low)	HQ High (Low)	HQ High (Low)
Aroclor 1254	4.7 (0.24)	2.8 (0.8)	5.2E-04 (2.6E-05)	3.8E-03 (1.1E-03)
2,3,7,8-TCDD	5.5 (0.55)	72 (7.2)	5.4E-04 (5.4E-05)	9.5E-02 (9.5E-03)

As shown in the table, the risk levels for birds exposed to Aroclor 1254 and dioxin-like PCB congeners (as 2,3,7,8-TCDD) were very similar. However, the risk levels for mammalian species exposed to 2,3,7,8-TCDD were about an order of magnitude higher than the risk level for exposure to Aroclor 1254. In the case of the shrew, the estimated HQ for 2,3,7,8-TCDD was 72 (high), and even the low HQ of 7.2 still exceeded the target risk level of 1. These results indicate the potential for risks to small mammals at the site from exposure to dioxin-like PCB congeners.

It should be noted that the PCB composition data used to estimate the 2,3,7,8-TCDD equivalent concentrations were based on the congener profile for Aroclor 1254. Due to weathering processes that may occur on site, the actual composition of PCB congeners in the soil may differ somewhat from the Aroclor 1254 congener profile. If the actual percentages of dioxin-like PCB congeners in site soil are greater than the values used based on the Aroclor 1254 congener profile, the risk levels for site receptors would be relatively higher than the values provided in the above table. Congener-specific sampling at the site would help to determine the occurrence and actual concentrations of these compounds at the site, and therefore may provide a more accurate risk estimate for ecological receptors from exposure to dioxin-like PCB congeners.

Specific Comments:

1. Executive Summary (page i, 4th paragraph).

   The text indicates that soil/sediment samples were collected from the wetland area in December 2004, January 2005 and April 2005, for a depth interval of 0-6 inches. Is the rationale for the selected depth interval of 0-6 inches included in the report? Ecological receptors may be exposed to depths greater than 6 inches depending on the receptor type. Rationale such as evidence that the PCB contamination is limited to surficial soil or that specific guidance recommends the evaluation of the 0-6" depth interval for ecological receptors should be provided.

2. Section 5.1.3.1 Potential Receptors (page 15).

The potential receptors in the evaluation do not include a mammalian carnivore that primarily feeds on vertebrate prey species. The raccoon is included, which does prey on small mammals for a portion of its diet (25%), but, based on exposure assumptions used in the report, the majority of the raccoon's diet consists of vegetation and invertebrates (75%). Including a mammalian carnivore species such as the red fox that has a higher proportion of small mammals and other vertebrate prey species in its diet will represent the potential exposure that occurs from consumption of these prey organisms. This is particularly relevant for the evaluation of PCBs which tend to bioaccumulate in higher trophic-level organisms.

3. Section 5.1.3.1 Potential Receptors (page 15).

It was noted that wetland/terrestrial plants were not included as potential receptors in the evaluation. These receptors do occur in the wetland area and should therefore be considered in the assessment. In cases where toxicity data are not readily available, potential effects may be discussed qualitatively.

4. Section 5.2.1.2 Sediment Interstitial Water and Surface Water (page 17).

Is there a reference available for the equation Csw = Cswi/10 (the conversion of interstitial water concentration to overlying surface water concentration)? If available, please include in the report.

5. Section 5.2.1.4 Prey Species (page 18).

This section details the methodology to estimate the Contaminant of Concern (COC) concentration in the shrew as a prey species. The shrew's total COC ingestion is multiplied by the mammal biotransfer factor (day/kg tissue) to estimate the COC concentration in shrew tissue. The mammal biotransfer factor is based on a regression using the COC's n-octanol/water partition coefficient.

Two comments regarding the methodology used: 1) There are several methods available to estimate concentrations in prey including the approach described above and the use of uptake factors or regression models based on the relationship between soil contaminant concentrations and contaminant concentrations in small mammals. It may be preferable to use the empirically derived uptake factors (if available) rather than the mammal biotransfer factor based on the contaminants octanol/water partition coefficient. 2) According to the EPA 1999 document that was referenced on page 18, the equation used to estimate BA_{mammal} ($\log BA_{mammal} = -7.6 + \log K_{ow}$) may not be appropriate to estimate the mammal biotransfer factor for dioxin-like compounds. Therefore, if dioxin-like compounds were evaluated, the BA_{mammal} would need to be estimated using alternative methods.

6. Section 5.2.2.1 Terrestrial Invertebrates (page 19).

The text states that the TRVs for terrestrial invertebrates are based on acute toxicity since the assessment endpoint for this receptor group is survival. The TRV for PCBs (as Aroclor 1254) given in Table 15 of 251 mg/kg is an acute median LC_{50} value. However, terrestrial invertebrates present at the site are likely to be exposed to PCBs in soil for longer periods than the duration of an acute toxicity test (typically 24-96 hrs.), even if the wetland area is intermittently submerged. Therefore, the TRV used for PCBs in the risk assessment may not be sufficiently conservative for site receptors. It is recommended that a chronic TRV (= LC_{50} TRV/100) be used for these receptors. The chronic TRV will also be more protective of sub-lethal endpoints (e.g., growth, reproduction) that are important in maintaining an invertebrate population that can support higher trophic-level receptors.

7. Section 5.2.2.2 Aquatic Invertebrates (page 19).

The text states that the TRVs for aquatic invertebrates are based on acute toxicity since the assessment endpoint for this receptor group is survival. The use of acute toxicity TRVs may not be appropriate for these receptors since they may be exposed to contaminants in surface water for longer durations than the exposure periods for acute toxicity tests (typically 24 – 96 hours). Please see previous comment on terrestrial invertebrate TRVs.

8. Section 5.2.2.2 Aquatic Invertebrates (page 19).

The evaluation for aquatic invertebrates is limited to exposure to interstitial surface water. Exposure to sediment also needs to be considered, particularly for compounds like PCBs that partition to sediment rather than surface water. The text states that water TRVs were selected rather than the bulk sediment concentrations because sediment values do not account for organic carbon content of the sediment and bioavailability. The sediment pathway still needs to be evaluated, and the effects of site-specific conditions such as organic carbon content can be included in the discussion.

9. Section 5.2.2.3 Amphibians (pages 19-20).

Only surface water exposure was considered in the evaluation for amphibians. Exposure to sediment should also be considered, particularly since PCBs are likely to partition to sediment. (If amphibian toxicological data for sediment exposure are not readily available for PCBs, this pathway can be addressed qualitatively).

10. Section 5.2.3 Exposure and Risk Characterization Equations (page 22).

The units for IR_{soil}, IR_{food}, and IR_{SW} should be changed to kgDW/kgBW-dy, kgWW/kg BW-dy, and L/kg BW-dy, respectively.

11. Table 2 - Summary of Wetland Soil/Sediment Analytical Results.

This table indicates that there were 124 samples of Total PCBs but the ProUCL summary in Appendix C states that there were 128 samples; these tables need to be consistent. Other discrepancies include the mean PCB concentration in Table 2 (908 ug/kg) and in the ProUCL output (968 ug/kg) and the median PCB concentration in Table 2 (116 ug/kg) and the ProUCL output (121 ug/kg). Also, the environmental EPC for PCBs in Table 2 should be given in ug/kg to be consistent with the Total PCBs column heading.

12. Appendix D and Appendix E, Risk Calculations for the Red-tailed hawk, Short-tailed Shrew and Raccoon.

The F_{food} columns in these tables should be unitless.

13. Appendix E, Table E-1. Risk Calculations for the Short-tailed Shrew.

In estimating the PCB (Aroclor 1254) concentration in vegetation from the equation provided ($C_{veg} = C_{soil} * BCF_r *0.12$), a soil concentration of 2.09 mg/kg, and a BCF_r of 1.27E-02, I calculated the C_{veg} to be 3.2E-03 mg/kg WW. This value differed from the C_{veg} in the table of 2.2E-05 mg/kg. Because the exposure from vegetation is a very small part of the total exposure for the shrew this discrepancy did not appear to impact the total exposure and risk levels.

Please feel free to contact me if you have any questions.

<u>References</u>:

Sample, B.A., D.M. Opresko, and G.W. Suter II
1996 *Toxicological Benchmarks for Wildlife: 1996 Revision*. Oak Ridge National Laboratories. Oak Ridge, TN.